KFUPM - COMPUTER ENGINEERING DEPARTMENT

COE-543 – Mobile Computing and Wireless Networks

Quiz 1: Due Oct 1st, 2011.

Student Name:
Student Number:

Problem 1 (20 points): On the subject of large scale fading for signals:

Assume shadowing for an RF signal (measured in dB) can be modeled by a Normal random variable (RV) with standard deviation equation to 8 dB. Compute the large scale fading margin if the signal is to be above the local mean predicted by the path loss model 99% of the time. Repeat the calculations if the required quality is reduced to 90%.

Problem 2 (20 points): On the subject of small-scale fading for signals:

The power-delay profile of a channel is specified by the following Table.

a) Calculate the excess delay spread,

b) Calculate the mean delay spread, and

c) Calculate the RMS delay spread

d) Sketch the power-delay profile

e) What is the coherence bandwidth for this channel?

f) Would the channel be considered a wideband channel for a binary data system at 25 kbps? Why?

Relative delay, τ, in micro seconds	Average relative power, σ^2, in dB (linear)
0.0	-1.0 (0.7943)
0.5	0.0 (1.0000)
0.7	-3.0 (0.5012)
1.5	-6.0 (0.2512)
2.1	-7.0 (0.1995)
4.7	-11.0 (0.0794)

Hint: The rms delay spread is given by $\tau_{rms} = \sqrt{\frac{\sum_{k=0}^{N} \tau_k^2 \sigma_k^2}{\sum_{k=0}^{N} \sigma_k^2} - \left(\frac{\sum_{k=0}^{N} \tau_k \sigma_k^2}{\sum_{k=0}^{N} \sigma_k^2} \right)^2}$